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but open still to the objection of involving too many subordinate computations.

Equation (1) *by Spherical Trigonometry.*

Let δ = true distance and δ' = apparent distance of sun and moon.

Let $a_{,}\, b_{,}$ be the true zenith distances.

and $a'\, b'$ be the apparent zenith distances.

Then $\cos \delta = \cos a \cos b + \sin a \sin b \cos \angle Z$

and $\cos \delta_{,} = \cos a' \cos b' + \sin a' \sin b' \cos \angle Z$

And eliminating $\cos \angle Z$

$$\sin a' \sin b' \cos \delta - \sin a \sin b \cos \delta' = \left.\begin{array}{r} \sin a' \cos a \sin b' \cos b \\ - \sin a \cos a' \sin b \cos b' \end{array}\right\}$$

$$= \sin (a' - a) \sin b' \text{ as } b + \sin (b' - b) \sin a \cos a'$$

$$\therefore \quad \cos \delta = \frac{\sin a \sin b}{\sin a' \sin b'} \cos \delta_{,} + \sin \varpi \cos \beta + \sin \varpi \cos \alpha \text{ nearly.}$$

Observations of Donati's Comet made at Haddenham, Bucks.

By the Rev. W. R. Dawes.

The following are a few extracts from this paper, which the Council will, in all probability, order to be printed *in extenso* in the forthcoming volume of *Memoirs*, along with a few others on the same subject. The author states that his observations of the comet were made with an excellent object-glass of 7¼ inches aperture, by Mr. Alvan Clark, applied to his Munich equatoreal mounting.

"1858, Sept. 12. Sky remarkably clear. Comet found with the equatoreal at $6^h\ 43^m$ G.M.T., and was at that time well and easily seen. At $8^h\ 32^m$ the visible length of the tail was $3^\circ\ 30'$. A fine object to the naked eye. In the telescope the nucleus appears quite planetary. Long after the head had set, the tail was visible, rising obliquely from the horizon, and might have been seen all night but for the intervention of trees in the northern horizon. The comet was a beautiful object in the north-east at 15^h."

"Sept. 24. Visible in the finder of the equatoreal at $6^h\ 10^m$. The arc or sector round the southern, or *sun-ward*, side of the nucleus is finely seen to-night, though the sky is not perfectly free from haze. I cannot trace the arc round on the side opposite to the sun; it seems to come to a rather abrupt termination at about 40° beyond a semicircle, being visible to about that extent further into the tail on the eastern side than on the western. It looks like a *hood* set on awry, the tail resembling a fine gauze veil dependent from it. The narrow dark channel extending from the nucleus up the axis of the tail is very remarkable: its edges are surprisingly well defined, especially very near the nucleus. The comparatively sharp definition of

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the eastern edge of the tail contrasts strikingly with the softness of outline on the western side."

"There is a second arc very close to the nucleus, and rather bright, and I think nearly uniformly so throughout its extent. The larger sector, on the contrary, is decidedly brighter towards its outer edge, and terminates rather sharply for such an object. A soft nebulosity or coma surrounds the larger arc, and appears to be concentric with it. Its outline is certainly not continuous with that of the tail, the apex of which falls *within* the arc of the sector.

"By measurement of a careful sketch, the middle radius of the sector (drawn from the nucleus to the middle of the arc) makes an angle with the direction of the dark channel in the tail of about 156°, reckoned round by the *east* side."

"Oct. 5. At $6^{h}\ 30^{m}$ G.M.T. *Arcturus* is just within the eastern boundary of the comet's tail, and about 20′ north of the nucleus.

"The edge of the outer sector is much more indistinct tonight than it was some days ago, and so is also the edge of the eastern side of the tail. The inner sector is astonishingly enlarged since Oct. 2. There is in it an irregular *dark* spot on the western side of the nucleus; and a little to the north of that dark spot, and nearer to the nucleus, there is a *bright* spot softly defined and less bright than the nucleus.

"At $7^{h}\ 11^{m}$ *Arcturus* is judged to be in the middle of the tail.

"At $7^{h}\ 15^{m}$ *Arcturus* is in the dark channel.

"At $7^{h}\ 56^{m}$ *Arcturus* is just out of the tail on the western side.

"The following are measurements of angles of position and distances of the nucleus of the comet with respect to *Arcturus*, the comet *preceding* the star to the *south*:—

	h m s		°		′ °
At	7 34 30	P =	208·3	D =	21 35·6
	7 39 35		205·5		
	7 40 47		...		21 53·3
	7 50 15		200·7		22 26·6

"Mr. Carrington having suggested to me to observe the angles of position of a series of tangents to the curve formed by the eastern edge of the tail, I endeavoured to do so; though my apparatus is not well suited to such an observation, for which a very low power and large field would be more appropriate than those ordinarily belonging to the parallel wire-micrometer. It is essential that the points at which the wire is made, a tangent should be pretty accurately determined; but this was not very easy to do. The mode which struck me as the most practicable was, to fix on certain differences of north polar distance from the nucleus. Having, therefore, brought

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the nucleus to the cross-wires in the field, I set the declination circle half a degree northward, and observed a tangent; and so on, at intervals of half a degree. But I found that, after the fourth setting, the edge of the tail became so diffused, that the observations could not be carried further with any certainty. The results were as follows; power 96:—

At 0° 30′	north of the nucleus,	pos. of tangent	= 218°·2	G.M.T. =	8h 23m
1 0	,,	,, ,,	216·2	,,	8 31
1 30	,,	,, ,,	213·1	,,	8 33
2 0	,,	,, ,,	212·3	,,	8 36

"The tail reaches to-night to the triangle formed by θ, ι, and κ *Bootis*, and is therefore from 30° to 35° in length. The middle radius of the *interior* sector makes an angle of about 176° with the direction of the dark channel. The *exterior* sector is not sufficiently well defined at its extremities to admit of accurate estimation of the middle point of its arc; but its direction does not differ much from that of the interior sector.

"Oct. 8. During broad daylight I set the equatoreal to the place of the comet indicated by Farley's ephemeris. On applying my eye to the telescope at 5^h 20^m G.M.T., while the sun was shining brightly into the observatory, the comet was instantly seen in the centre of the field. This was the only occasion on which I was able to detect it while the sun was above the horizon; though at the time noted it was so plainly seen that I think it probable it might have been perceived at least ten minutes sooner. On two or three days I think it might have been perceived if the sky had been free from haze; but the effect of a very slight film of haze when acted upon by the sun is fatal to the visibility of such an object.

"On examining the form of the nucleus as thus seen during sunshine, I was immediately struck with its *elongated* and even *crescent* shape, the convexity being towards the sun. This was the whole of the comet which was visible; and it certainly gave me a strong impression of its *solidity* and *opacity*, as presenting a true *phase;* and thus satisfactorily accounting for the dark line extending from it in the direction of the axis of the tail. As the daylight diminished, the distinct outline of the nucleus was rapidly lost through the brightness of the coma immediately in contact with it.

"7^h 30^m, The comet is finely seen. The bright nucleus is much smaller than it was. A small bright semicircular arch surrounds it on the sunward side, and a much larger arch, not so bright, outside of it, which becomes decidedly brighter towards its outer edge. And exterior to that, on the *western* side, and only a few seconds from it, there is a portion of a *third* arch, extending *sunwards* for a few seconds, and it is then gradually lost in the faint nebulosity which surrounds the sunward side of the larger arch.

"There is a *bright spot* of rather irregular shape (rather *pear-shaped*, with the smaller end towards the nucleus) on the western side of the nucleus; and a streak of light extending almost directly sunward from the smaller arch to the edge of the larger arch. The middle radius of the exterior sector makes an angle of about 188° with the direction of the dark channel as deduced from my sketch of its appearance.

"Oct. 11. The *interior sector* has greatly increased since the 8th. It is much *mottled*, the luminosity in different parts being far from uniform. To the south-west of the nucleus it has a very *dark* spot, rather pear-shaped, the smaller end being toward the centre; and also a *bright* spot nearly to the west of the nucleus, and only a few seconds from it, looking rather like a second, smaller, and fainter nucleus. There is also a bright irregular streak, extending sunward from the nucleus to the arc of the inner sector. The middle radius of the sector is now inclined to the axis of the tail (reckoned round the *east* side as before) at an angle of about 205°, as deduced from my sketch.

"Oct. 17, 6^h 18^m. The comet is dim and hazy, but a marked peculiarity was immediately observed in the head. The nucleus is *very eccentric* (towards the *orbital* preceding side) with respect to the inner arch; and also, though not so strikingly, with respect to the out erarch. The inner arch is much smaller than that seen on the 11th. Scarcely any tail is visible in the strong twilight and so near the horizon. A bank of clouds soon covered that part of the sky, and the weather did not subsequently permit the comet to be seen at all.

"*Haddenham, Thame,*
"*January*, 1859."

Note on Saturn and his Rings, with a Sketch of the Planet.

By Capt. Noble.

The accompanying sketch* is intended to indicate a feature in the detail of the planet *Saturn*, which is not delineated in any of the engravings to which I have access, and of which I can find no mention in any of the published accounts of Saturnian topography in my possession. I allude to the curvature of the shadow of the ring (or rings), on the ball of the planet. In Captain Jacob's admirable and most truthful drawing, this shadow, which, it seems to me, *should* (at the epoch of its execution) have exhibited this curvature, is represented as bounded by an edge strictly parallel to that of the exterior edge of ring A; whereas, on the night on which my sketch was made (and I have had one corroborative glimpse since), the curvature was so marked as at once to strike the eye on its

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* This drawing was exhibited at the Meeting.